

DEPARTMENT OF CONSUMER AND INDUSTRY SERVICES

DIRECTOR'S OFFICE

CONSTRUCTION SAFETY STANDARDS

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(By authority conferred on the director of the department of consumer and industry services by sections 19 and 21 of Act No. 154 of the Public Acts of 1974, as amended, and Executive Reorganization Order No. 1996-2, being §§408.1019, 408.1021 and 445.2001 of the Michigan Compiled Laws)

PART 2. MASONRY WALL BRACING

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GENERAL PROVISIONS

R 408.40201. Scope.

Rule 201. This part pertains to the temporary bracing of unsupported masonry walls during construction which are exposed to wind forces.

R 408.40202. Applicability.

Rule 202. This part is designed to ensure a safe work environment for all personnel on the construction site through the use of temporary bracing of unsupported masonry walls. The requirements of this part are as follows:

- (a) Identifying masonry walls requiring temporary bracing (R 408.40204(1)).
- (b) Proposing an acceptable temporary bracing system (R 408.40207).
- (c) Vacating the collapse area during winds of 35 mph or more (R 408.40204(9) and R 408.40205).
- (d) Standard sign requirements for collapse areas (R 408.40208), which are all designed to prevent on-site injury. While winds of more than 35 mph may cause collapse of walls braced in accordance with this part, compliance with all of the other provisions of this same part will ensure that no one will be within the collapse area.

R 408.40203. Definitions; C to U.

Rule 203. (1) "Cavity wall" means a masonry wall with a continuous insulated or uninsulated air space of 2 to 4 1/2 inches between wythes that are connected with rigid metal ties.

(2) "Collapse area" means that area which is within the height of the wall, plus 4 feet, measured at right angles to the wall on both sides.

(3) "Composite wall" means a bonded masonry wall with 2 or more wythes of different masonry units.

(4) "Qualified person" means a person who, by knowledge, training, or experience, has the ability to solve or resolve problems relating to the subject matter or the work.

(5) "Single wythe hollow masonry" means a masonry wall 1 unit in thickness made up of units with bearing surfaces that are less than 75% solid.

(6) "Solid masonry unit" means a masonry unit with bearing surfaces that are 75% or more solid.

(7) "Unsupported masonry wall" means a masonry wall that has not obtained its final lateral stability from design features when required, such as roofs, floors, buttresses, crosswalls, and piers.

R 408.40204. Maximum unsupported height tables.

Rule 204. (1) The maximum unsupported height of a masonry wall shall not be more than the height shown in tables 2 to 5 of this rule. Unbraced walls exceeding the heights specified in these tables are in imminent danger of collapse.

(2) The exposure to which a wall is subjected for use in tables 2 to 5 shall be determined from table 1, which reads as follows:

TABLE 1

Exposure Selection

Exposure	Example
A	Center of large cities and very rough hilly terrain.
B	Suburban areas, towns, city outskirts, wooded areas, and rolling terrain.
C	Flat, open country, open flat coastal belts, and grasslands.

(3) Exposure A shall not be used in Michigan.

(4) Table 2 reads as follows:

TABLE 2
Single Wythe Hollow Masonry

Width of Wall	Minimum Weight psf	Maximum Unsupported Height	
		Exposure B	Exposure C
		(1)	(2)
4 in.	25	6 ft. (2 ft.)*	6 ft. (1 ft.)*
6 in.	34	6 ft. (5 ft.)*	6 ft. (2.5 ft.)*
8 in.	40	7 ft. (7 ft.)*	6 ft. (4 ft.)*
10 in.	48	10 ft. (10 ft.)*	6 ft. (6 ft.)*
12 in.	56	14 ft. (14 ft.)*	9 ft. (9 ft.)*
16 in.	75	24 ft. (24 ft.)*	16 ft. (16 ft.)*

* See subrule (8) of this rule.

(5) Table 3 reads as follows:

TABLE 3
Solid Brick Walls

Width of Wall	Minimum Weight psf	Maximum Unsupported Height	
		Exposure B	Exposure C
		(1)	(2)
4 in.	40	6 ft. (3 ft.)*	6 ft. (2 ft.)*
8 in.	80	12 ft. (12 ft.)*	8 ft. (8 ft.)*
12 in.	120	20 ft. (20 ft.)*	19 ft. (19 ft.)*
16 in.	160	26 ft. (26 ft.)*	26 ft. (26 ft.)*

* See subrule (8) of this rule.

(6) Table 4 reads as follows:

TABLE 4
Composite Walls — 4-inch Brick and Hollow Block Units (Various Widths)

Width of Wall Total	Brick	Block	Min. Weight psf	Maximum Unsupported Height	
				Exposure B	Exposure C
				(1)	(2)
8 in.	4 in.	4 in.	65	9 ft. (9 ft.)*	6 ft. (5 ft.)*
10 in.	4 in.	6 in.	74	13 ft. (13 ft.)*	9 ft. (9 ft.)*
12 in.	4 in.	8 in.	80	16 ft. (16 ft.)*	11 ft. (11 ft.)*
14 in.	4 in.	10 in.	88	19 ft. (19 ft.)*	14 ft. (14 ft.)*
16 in.	4 in.	12 in.	96	26 ft. (26 ft.)*	17 ft. (17 ft.)*

* See subrule (8) of this rule.

(7) Table 5 reads as follows:

TABLE 5
Cavity Walls — 4-inch Brick and Hollow Block Units (Various Widths)

Wall Section			Maximum Unsupported Height			
Brick + Block		Minimum Weight psf	Exposure B		Exposure C	
			(1)	(2)	(1)	(2)
4 in.	4 in.	65	6 ft. (2.5 ft.)*		6 ft. (1.5 ft.)*	
4 in.	6 in.	74	6 ft. (5 ft.)*		6 ft. (2.5 ft.)*	
4 in.	8 in.	80	8 ft. (8 ft.)*		6 ft. (4.5 ft.)*	
4 in.	10 in.	88	11 ft. (11 ft.)*		7 ft. (7 ft.)*	
4 in.	12 in.	96	27 ft. (27 ft.)*		18 ft. (18 ft.)*	

* See subrule (8) of this rule.

(8) If employees within the collapse area are working from elevations that are lower than the bottom elevator of the wall, the maximum unsupported height of a masonry wall shall be determined from values given in column (2) of tables 2 to 5.

(9) No one shall be permitted within the collapse area of an unbraced or braced wall subjected to winds of more than 35 miles per hour.

R 408.40205. Wind velocity; determination by qualified person.

Rule 205. For the purpose of this part, the wind velocity shall be determined by a qualified person.

R 408.40206. Wall bracing design.

Rule 206. (1) When the height of a masonry wall exceeds the maximum unsupported height as shown in tables 2 to 5 of R 408.40204, the masonry wall shall be braced on both sides upon completion. Crosswalls are acceptable instead of bracing an interior wall if the crosswalls are not spaced more than 20 feet apart. If crosswalls are spaced more than 20 feet apart, wall bracing in accordance with the requirements shall be provided.

(2) On masonry projects that require temporary bracing, the wall bracing system shall be determined before a masonry wall exceeds the maximum unsupported height limits specified in tables 2 to 5 of R 408.40204.

(3) The wall bracing system for a masonry wall shall be designed by a qualified person in accordance with acceptable engineering practices or as prescribed in this part and shall be capable of providing stability to the wall for a wind with a velocity of 35 miles per hour.

(4) If pilasters, buttresses, or other reinforcing is part of the wall design, the unsupported height of walls according to tables 2 to 5 of R 408.40204 may be exceeded by complying with accepted engineering practices. Calculations or plans and specifications shall be available at the jobsite.

(5) If scaffolding, because of work operations, remains erected on 1 side of the completed wall, the collapse area shall be identified and marked. No one shall be permitted within the collapse area when the wind velocity is more than 35 miles per hour.

(6) The height of a masonry wall above the intersection of the diagonal support with the vertical plane of the wall shall not be more than the maximum unsupported height as shown in tables 2 thru 5 of R 408.40204.

R 408.40207. Typical wall bracing system.

Rule 207. (1) A typical wall brace may consist of 4 essential parts as follows:

- A 16-foot, 2-inch by 10-inch vertical upright.
- A 16-foot, 2-inch by 10-inch diagonal strut.
- A 2-inch by 4-inch stiffener.
- A deadman.

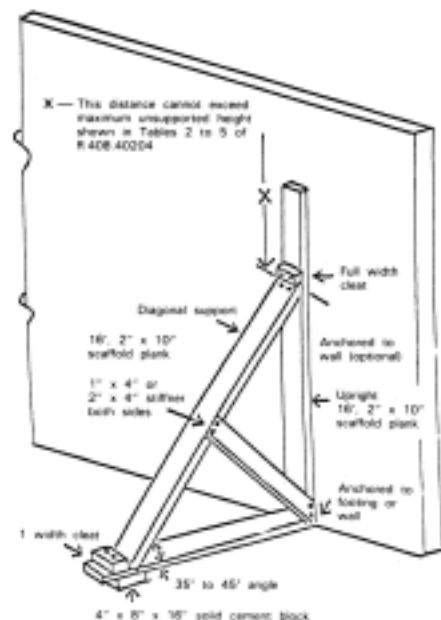
(2) The angle of intersection of the 16-foot, 2-inch by 10-inch diagonal strut and the ground should be between 35 degrees and 45 degrees and the diagonal strut should not intersect the vertical brace below the midpoint of the masonry wall.

(3) When using this typical wall brace, the total wall bracing system shall be designed in accordance with the provisions of this rule and R 408.40206.

(4) Other materials and designs may be used in the construction of a wall bracing system if the design requirements of this rule and R 408.40206 are met.

(5) The following figure is an example of a typical wall brace.

FIGURE 1
Typical Wall Brace for Masonry Wall



(6) The maximum spacing for typical exterior wall bracing shall not be more than 20 feet. Table 6 specifies typical exterior wall bracing requirements and reads as follows:

TABLE 6
Typical Exterior Wall

8 inch wall	18 feet maximum height
12 inch wall	22 feet maximum height

R 408.40208. Signing.

Rule 208. (1) Each unsupported masonry wall that is more than 6 feet in height, braced or unbraced, and 50 feet or less in length shall be posted with a danger sign on each side of the wall.

(2) Each unsupported masonry wall that is more than 6 feet in height, braced or unbraced, and more than 50 feet in length, shall be posted with danger signs at each end of the wall and at intervals of not more than 100 feet along each side of the wall.

(3) When scaffolding is in place along an unsupported masonry wall, the posting requirements of subrule (1) or (2) of this rule are only required for the unscaffolded portions of the wall.

(4) The danger sign shall be placed in a conspicuous location either on the wall or anywhere within the collapse area.

(5) The danger signs shall be maintained in place and in a legible condition until the masonry wall is permanently supported.

(6) A danger sign as required by subrule (1) or (2) of this rule shall comply with all of the following requirements:

- (a) Be 10 inches in height by 14 inches wide.
- (b) Have the word "DANGER" in white characters which are, 2 1/6 inches high and which appear within a red oval which is 4 1/8 inches high by 11 7/8 inches long and which is in the top 1/2 of the sign.
- (c) Have the lower 1/2 of the sign state, "This Unsupported Wall is Unstable in Windy Conditions."

(7) An illustration of a danger sign which complies with the requirements of subrule (6) of this rule is shown in the following figure:

FIGURE 2



R 408.40209. Inspection.

Rule 209. An unsupported masonry wall, including the wall bracing system, shall be inspected for damage by a qualified person after each windstorm if the wind velocity was more than 35 miles per hour. If any movement of the wall or other physical damage, including damage to the wall bracing system, is found, only those persons repairing the wall or wall bracing system shall be permitted to work within the collapse area until repairs have been made.

R 408.40210. Wall bracing system; responsibility for installation; responsibility for replacing system and danger signs.

Rule 210. The masonry contractor shall be responsible for the initial installation of the wall bracing system. After a wall bracing system and danger signs have been installed in accordance with the provisions of this part, any party, including a subcontractor, general contractor, or owner, who alters or removes the bracing system or danger signs shall be responsible for replacing the bracing system and danger signs in accordance with the provisions of this part.